DOCUMENT RESUME

ED 134 966 CS 003 229

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TITLE The Effect of Adjunct Questions on Conceptual Learning in Prose Materials.
PUB DATE 76
NOTE 14p.; Paper presented at the Annual Meeting of the International Reading Association Southeastern Regional Conference (4th, Jacksonville, Florida, February 18-21, 1976)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS College Students; Concept Formation; Higher Education; Learning Processes; *Prose; *Questioning Techniques; *Reading Comprehension; *Reading Research; *Verbal Learning

ABSTRACT

The effect of supplementary questions on learning from textual materials was investigated in a sample of 94 college juniors. Each subject was given a 1,500-word passage describing the concept of measurement. One treatment group was asked to identify characteristics of the concept; another was asked to identify examples from the text; a third listed new examples; a control group was given a placebo task. The effect of telling students that the passage described a concept was also investigated. No significant treatment effects were found. (Author/AA)

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The Effect of Adjunct Questions on Conceptual Learning in Prose Materials

Abstract

The effect of supplementary questions on learning from textual materials was investigated. 94 college juniors were given a 1500 word passage describing the concept of measurement to read. One treatment group was asked to identify characteristics of the concept; another was asked to identify examples from the text; a third listed new examples; a control group was given a placebo task. In addition, the effects of telling students that the passage to be read described a concept was investigated. No significant treatment effects were found.

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THE EFFECT OF ADJUNCT QUESTIONS ON CONCEPTUAL LEARNING IN PROSE MATERIALS

Introduction

Helping students derive meaning from printed material is a problem that faces reading teachers as well as teachers in the content areas. One area of research that appears potentially helpful in this area, is that done in the area called mathamagenic behavior (Rothkopf, 1970). Rothkopf coined this term to refer to a set of attending behaviors that are used by students in the reading processes and that lead to learning. Often these behaviors are naturally occurring, but research has shown that there is much that the classroom teacher can do to aid the student in his interaction with printed material. For example, a number of studies (Rothkopf, 1966, 1967; Frase, 1967, 1968; Bruning, 1968) have shown that questions interspersed in text have had a beneficial effect on the acquisition and retention of factual material embedded within the text. Interestingly enough, the effect of these questions has encompassed not only the specific material referred to by the questions, but also information that is incidental to the specific question itself. Those researching the effectiveness of mathamagenic-inducing aids have interpreted these results as occurring as a result of searching types of behaviors which are induced in the learners by the questions.

Design

The present study is an investigation of the effects of different types of mathamagenic cues on the learning of a concept

from printed material. Subjects for the study were 94 undergraduates enrolled in five teacher education courses at the University of North Florida. The concept measurement was utilized in the study. This concept was chosen because the meaning of this concept as defined in the text materials was unique to a particular course which the subjects had not yet taken. Consequently the effects of prelearning would be minimized. The text describing the concept was written for the experiment and was approximately 1500 words in length.

The major variable investigated in this study was the effect of different types of questions on the learning of a concept from prose materials. Researchers investigating the effects of different types of questions have found that different types of questions have different effects on learning (Kauchak, et al; 1976;Watts and Anderson 1971). In a study involving principle learning from prose materials, Watts and Anderson found that subjects who identified new examples of a principle learned the principle better than subjects who identified previously presented examples. The present study employed three types of questions which were placed approximately half way through the text and at the end. The treatments conditions including the control were: 1) Control, which were asked to provide information about career goals as a placebo substitute for the treatment; 2) Examples, in which subjects were asked to recall examples of the concept from the text; 3) New Examples, in which subjects were asked to provide additional examples of the concept; and 4) Attributes, in which subjects were asked to list the characteristics or attributes of the concept. Subjects were randomly assigned to these conditions within classrooms.

The second variable investigated was the effect of an advance organizer on concept learning from written materials. Studies by Ausubel (1960), Ausubel and Fitzgerald (1961) and Allen (1970) have shown that learning of written material can be facilitated by prior provision of generalizable statements which can aid the learner in organizing the material. Studies utilizing advance organizers have utilized content-oriented organizers whose primary value has been in their ability to organize or subsume the content that follows. The present study tested the effects of a conceptual organizer, whose effectiveness is derived from the learner's ability to see the conceptual nature of the task. It was hypothesized that readers who were told beforehand that the materials to be read described a concept would learn the concept better than those who were not. Subjects in each concept learning task within each classroom were randomly assigned to either the advance organizer condition or control.

Procedures

Subjects were randomly assigned in their classrooms to one of the four experimental conditions. Randomization was accomplished by placing the printed material in unmarked envelopes and randomly distributing these to the students during class time. Students were instructed to read the materials once, returning the sheets to the packet as they were read. When the students completed reading the materials, they were given a post test which was composed of three parts. The first part of the test, consisting of 51 items, required students to identify statements that were examples and non-examples of the concept measurement; the second part of the test, consisting of ten items, asked comprehension-

level questions over the material; the third part of the test, consisting of six items, tested for recall of specific information from the test. Students were given as long as they needed to complete the reading and the test.

Results

There were no significant differences on the total test score for either the effect of the advance organizer or the effect of different questions. When sub scores were considered, there were no significant differences between any of the treatments. The data are presented in an appendix to the main body of this paper.

Discussion

While the study discussed in this paper showed no statistically significant differences among treatments, a number of studies have shown that textual cases can increase the amount of information learned from written materials. Some of these studies were cited earlier in this paper.

The reason the present study failed to show significant differences may be explained in one or more of the following ways:

1) The treatment was administered early in the school term and may have induced a high level of arousal in the subjects. One of the hypothesized reasons for the effectiveness of mathamagenic cues is that they induce a motivational attention set in the learners. In this respect then mathamagenic cues can be thought of as priming elements alerting the student to the learning task at hand. The effects of such cues would

be minimized in conditions where the learner was already highly motivated. One explanation for the lack of significant differences was that all groups were already highly motivated by the fact that the treatment was administered in class during the first two weeks of a new quarter, a time in which undergraduates can be highly anxious over their success in a course. In the present study reported in this paper the unmeasured effect of arousal may have been enough to make differences in treatment effects impossible to detect.

2) The entire task may have been too complex and bewildering for the students. The criterion measure was difficult and sophisticated and this factor combined with the complex problem facing the students may have reduced treatment differences below a significant level. Support for this interpretation comes from an analysis of the treatment and criterion measures employed by Watts and Anderson (1971), the study which was most influential in the design of the present study. In the Watts and Anderson study the principles to be learned were embedded in much shorter reading passages (450 words vs. 1500 words) and consequently the search task was much less complex. In addition, their criterion measure involved a multiple choice format in which subjects knew that one of the four choices was correct. In the present study subjects were required to classify fifty-one

examples and non examples of the concept, not knowing how many were and were not examples of the concept. It is possible that the complexity of the task may have disturbed subjects to the point that differences due to treatments were masked.

Additional support for this contention comes from the fact that no differences existed in simple recall measures where one treatment cued the subjects specifically to these items. Other studies (Frase, 1968 Kauchak, (et al, 1976) have shown that cues to specific items significantly enhances recall of those items. The failure of differences in recall to exist suggests that the overall effect of bewilderment may have minimized treatment effects.

3) The nature of the task was primarily conceptual rather than factual. Most studies studying the effects of cues measure learning of facts rather than concepts. In that concept learning requires students to process information rather than merely recall it the differential effects of cues may be reduced or modified. The criterion measure used in this study was primarily written at the comprehension level (Bloom, 1956) and higher. In a related study, Frase (1971) found that subjects asked to make inferences over textual material remembered factual incidental information better, but failed to show any increased recall of inferential material. One of the hypotheses advanced by Frase

to account for this result was that the inferential questions caused cognitive overloading, thus diminishing subjects ability to encode the inference.

A related explanation for the failure of both the advance organizer and the adjunct questions is that subjects may not have been able to utilize these aids, i. e. perform the actions called for by these aids. Herber and Nelson (1975) have noted that comprehension aids to reading materials presuppose that the individual knows how to use these aids. Failure of this assumption negates the potential value of such aids.

The preceding paragraphs suggest the task of concept learning per se may effect the benefits to learning that can be derived from written cues. This suggestion, of course, doesn't account for the fact that no differences among groups was found for recall items as noted in an earlier paragraph of this discussion. These two factors suggest that the explanation for no significant differences among groups in this study (in contrast to other studies in the area of mathamagenic behavior) may be a combination of the possibilities discussed here. Further, the explanation may lie in some information which failed to surface in this study.

It is recommended that additional studies in this area be performed which simplify the design and measure the effect of student arousal. In addition such studies should employ simpler criterion measures which can potentially demonstrate places where concept learning is or is not occurring. For example, such studies might investigate more thoroughly whether characteristics and examples are being encoded in the learner's memory store.

Appendix

Table 1

Total Test Scores for Advance Organizer versus No Advance Organizer

Group	Mean Score
No Advance Organizer (N = 49)	38.00
Advance Organizer (N = 45)	39.13

F = .83 (N.S.)

Table 2

Total Test Scores for Different Questions

Group		Mean Score
I	(Control) (N=23)	38.17
II	(Text Examples) (N=23)	37.87
III	(New Examples) (N=23)	38.91
IV	(Characteristics) (N=25)	39.16

F = .23 (N.S.)

Table 3

Subtest Scores (Classifying Examples)
for Advance Organizer vs. No Advance Organizer

Group	Mean
No Advance Organizer (N=49)	30.06
Advance Organizer (N=45)	30.71

F = .34 (N.S.)

Table 4

Subtest Scores (Classifying Examples)
for Different Questions

Group		Mean Score
I	(Control) (N=23)	29.87
II	(Text Example) (N=23)	29.96
III	(New Examples) (N=23)	30.61
IV	(Characteristics) (N=25)	31.00

F = .23 (N.S.)

Table 5

Sub Test Scores (Comprehension) for Advance Organizer versus No Advance Organizer

Group	Mean Score
No Advance Organizer (N=49)	5.16
Advance Organizer (N=45)	5.09

F = .11 (N.S.)

Table 6

Sub Test Scores (Comprehension) for Different Questions

Group		Mean Score
I	(Control) (N=23)	5.13
II	(Text Example) (N=23)	4.87
III	(New Example) (N=23)	5.30
IV	(Characteristics) (N=25)	5.2

F = .70 (N.S.)

Table 7

Sub Test Scores (Text Specific) for Advance Organizer versus No Advance Organizer

Group	Mean Score
No Advance Organizer (N=49)	2.73
Advance Organizer (N=45)	3.09

F = 1.60 (N.S.)

Table 8

Sub Test Score (Text Specific) for Different Questions

Group		Mean Score
I	(Control) (N=23)	2.61
II	(Text Example) (N=23)	3.00
III	(New Example) (N=23)	3.00
IV	(Characteristics) (N=25)	3.00

F = .47 (N.S.)

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